The Northwestern MILLER
MILLING PRODUCTION SECTION

Manufacturing Grinding Rolls . . . . . By Centrifugal Casting Process

By Dr. E. Wettstein

BY the general term "rolls", we mean the rotating working members in a roller mill. Some centuries ago these working members consisted mostly of stone, and roller mills with iron rolls were first built at the beginning of the 19th century. But these grey cast-iron rolls did not comply with requirements, since the incised corrugations soon became blunt and the particles of graphite which then became detached, spoiled the color of the ground product. Towards the middle of the 19th century, machinery firms learned to produce the rolls by chilled casting, such as is generally adopted today, although the manufacturing processes have been altered.

Up-to-date manufacturing of rolls distinguishes between four different kinds of rolls, depending on the method of casting and on the alloys, all the different kinds being formed as tubes with a certain thickness. The outer wall thickness must be very hard for the grinding service, while the inner wall thickness is kept as soft as possible for reasons of stability and machining. According to the older method of casting, the rolls were cast chilled in vertical and stationary iron molds with clay cores, the latter determining the hollow space. The metal poured in is suddenly chilled on the cold walls of the mold, and thus a hard surface is produced. On the other hand, against the clay core in the interior a soft zone is formed in consequence of the slow cooling. Figures 1 and 1a, show cross-sections through such rolls, the outer white layer corresponding to the hard surface. In recent years, Buhler Brothers developed the centrifugal casting system (compound casting). In this process, the mold is no longer arranged vertically, but horizontally, and it rotates at a comparatively high speed. By means of a special device, a certain quantity of hard cast-iron is poured into this rotating mold, and it sets hard on the wall of the mold. The remaining, soft internal wall thickness is afterwards obtained by pouring in ordinary grey cast-iron. Here a clay core for forming the hollow space is no longer necessary, since this is produced in consequence of the centrifugal force acting on the cast-iron. An internal connection forms between the hard cast-iron and the grey cast-iron. With this process, the thickness of the hard layer can be varied as desired, depending on the quantity of hard cast-iron poured in (in contrast to the static casting) and suited to the momentary requirements (Figs. 2 and 2a, white outer zone).

Fig. 1a. Cross-section through such a roll, the outer white layer corresponding to the hard surface.

Fig. 2a. Cross-section through such a roll, the outer white layer corresponding to the hard surface. This hard layer is uniform and its thickness can be varied.

In order to determine the connecting of the hard cast-iron and the grey cast-iron, as well as any internal injurious defects in the material (cracks, blow holes, piping, etc.) without destroying the material and to judge how it can be applied, a supersonic testing appliance (Fig. 3) is adopted. The appliance makes use of a method of sending supersonic waves, which are inaudible to the human ear, through the object to be tested, whereby a so-called wave echo is reflected back at defective spots in the interior, this echo showing the position of the defect on the screen of an oscillograph. This supersonic appliance is a valuable addition to the nondestructive-testing apparatus working with X-ray and gamma-ray apparatus.

Non-alloyed rolls are normally used in grain mills, while chocolate and paint mills have alloyed rolls, some with a high percentage of alloy. By adding an alloy to the hard cast-iron in the centrifugal casting process, the surface hardness can be much increased without the core of the roll being too much affected. With the

(Turn to **ROLLS**, page 18a)

EDITOR'S NOTE: Dr. Wettstein is head of research for Buhler Brothers, milling engineers of Uzwil, Switzerland.

Fig. 4. "Briviskop" for determining the surface hardness "Brinell".

Fig. 5. "Perth-O-Meter" tests the surface roughness of the roll.

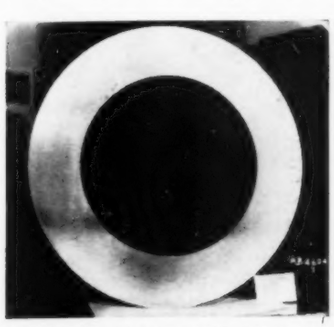


Fig. 1. Roll cast chilled in vertical and immobile iron mold (static casting).

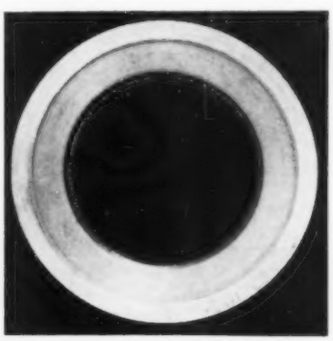
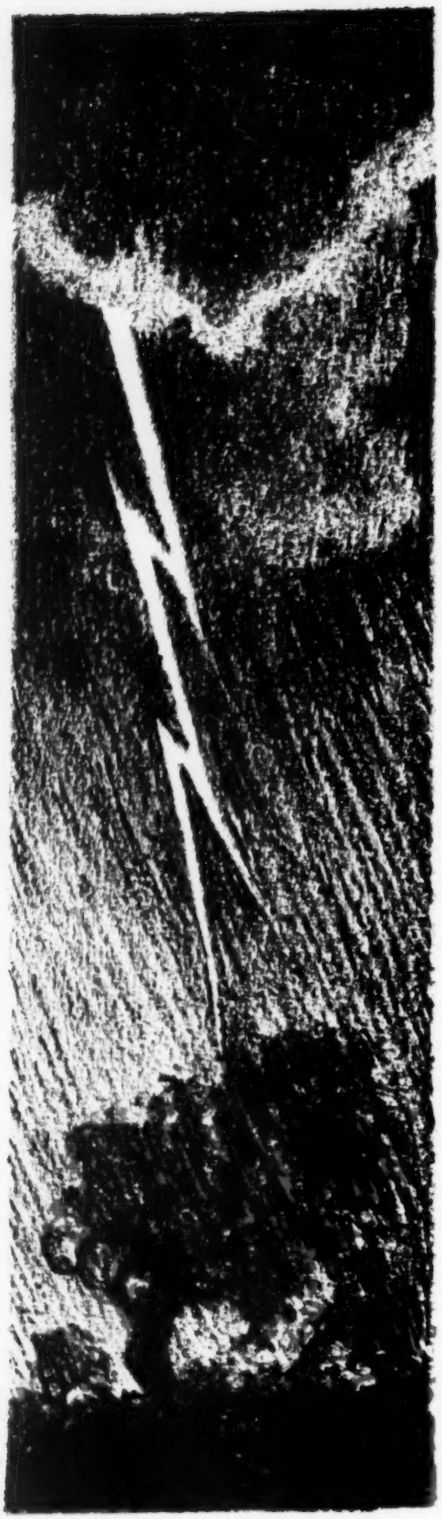


Fig. 2. Roll cast centrifugally (compound casting).

Fig. 3. Supersonic testing appliance for detecting any internal injurious defects in the material without destroying it.



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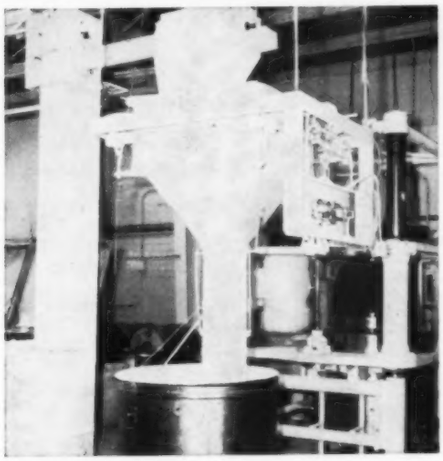
C. J. Patterson Moves Ahead with New Process



INGREDIENT STATION—The individual stainless steel dough bowls are charged with flour by this pneumatic loader. An attached cover that fits the bowl prevents blowing of flour.

FERMENTATION STATION—After initial mix, dough bowls with a capacity of up to 600 lb. dough are attached to this endless chain, covered, and make the circuit in 2½ hr. before re-mix. The chain at Albuquerque has a capacity of 16 bowls at a time, and an additional bowl can be attached every 9 min.

J. H. DAY MIXER—This specially designed, high speed mixer handles up to 4,000 lb. dough per hour and is used for both ingredient mixing and re-mix. Here with Clay Schmittou, Holsum bakery production superintendent, at the controls, the head and twin agitator arms are shown midway between raised and mix position. The agitator arms rotate at 120 rpm, the head at 40 rpm.

KANSAS CITY—C. J. Patterson Co. unveiled its new fermentation process in Albuquerque, N. M., earlier this year, thereby switching away from the former sponge dough method of bread making and, in the process, coining a new word to describe its procedures, "Ful-Flavor."

The name Ful-Flavor derives from the type of fermentation which characterizes the process—all flour for making the dough is present during fermentation, instead of the 60% to 70% customarily used in the fermentation of sponge doughs. This, Patterson officials explain, permits fermentation by-products responsible for the ultimate bread flavor to permeate all of the flour particles during fermentation. The result, they state, is a full-bodied flavor in the final bread product.

How It Works

The new process employs a modified remixed straight dough and incorporates vertical mixing in round dough bowls.

The first step is charging of ingredients into the dough bowls. All ingredients are added at this stage except salt and sugar. The bowls are of 600-lb. capacity made of stainless steel and mounted on casters for portability. Once charged with ingredients, the bowl is indexed into the mixer and the mixing head lowered and energized to blend the ingredients together. The initial blending requires less than one minute of mixing time.

The dough, thus set, is fermented for 2½ hours. A chain conveyor is utilized to move the bowls during fermentation and return them to the vicinity of the mixer. Sugar and salt are added following fermentation and the doughs then remixed in their original bowls to achieve full gluten development. Mixer agitator speed is considerably faster than conventional horizontal mixers and the development time of white bread doughs is usually less than 4 min., depending on flour mixing requirements. The mixing times of variety doughs are correspondingly less. The Mixatron, an electronic instrument for measuring dough consistency during mixing, is used in conjunction with the vertical mixer and allows accurate control of gluten development.

No refrigeration is employed in the process and final dough temperatures are in the vicinity of 92°-93° F. for white bread. Flour time is customarily in the range of 15-20 min. and adjustment in this processing factor is seldom necessary.

Doughs are dumped into the divider hopper by a hoist which elevates and completely inverts the bowls, discharging their contents into the hopper. The divider is conventional. From the divider the dough pieces immediately move to a short conveyor which shapes, dusts and delivers them to the moulder, which is also conventional. No rounder or overhead proofer is used. Panary proof is approximately 25% faster than sponge doughs.

Total processing time averages 2 hr., 45 min. less than the usual sponge dough procedure.

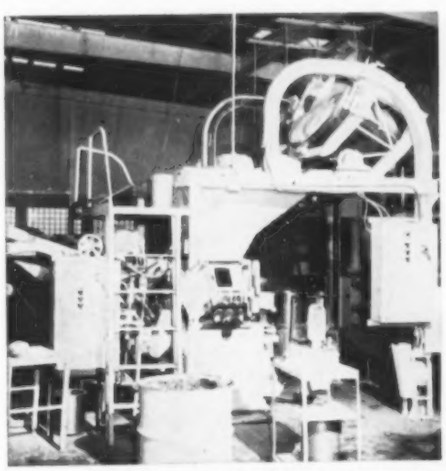
Flexibility in the production of varieties is excellent, since each bowl can contain a different type dough if desired and only the mixer agitator arms and divider need be cleaned in changing from one variety to another. Dough size may vary from 125 to 600 lb.

Inasmuch as the doughs remain in the bowls from the original mixing until they are dumped at the divider, the labor of a sponge mixer operation is eliminated. Further labor savings have resulted from the reduced processing time. Maintenance and sanitation hours are reduced through the elimination of certain equipment, primarily refrigeration and the overhead proofer.

Other operating costs are also lowered by virtue of a 50% reduction in fermentation loss, lower dusting flour usage, slightly increased absorption and lower power costs.

Equipment for the Patco Ful-Flavor process was manufactured by the J. H. Day Co., Cincinnati.

PATTERSON MIXATRON—Mark Condo, left, production manager of C. J. Patterson Co., and R. D. Mahoney, bakery manager, are shown reading the patented electronic device, the Mixatron, which registers dough consistency in the mixer. This unit is an important element in accurate mixing control.



BOWL HOIST AND DIVIDER—Specially designed electronic hoist (right), raises bowl and empties dough into conventional AMF divider. From the divider, dough travels through unique conveyor, replacing the conventional rounder, to the J. H. Day Co. cross-grain moulder. No overhead proofer is required in the process.

THE OFFICIAL TOUCH—Mayor Maurice Sanchez of Albuquerque pressed the button on an electronic control to officially inaugurate the new Patco Ful-Flavor breadmaking process. The control activated the big vertical mixer, an integral part of the process.

Elevator Check List for Sanitary Handling of Grain

THE Federal Food, Drug and Cosmetic Act, among other things, requires foods—including food grains—to be clean, and to be stored under conditions which protect them from filth. In the case of food grains, this means protection from insects, rodents and birds, and any other sources of contamination.

This report tells elevator operators some of the most important sources of contamination and how they may be eliminated. Final responsibility of course remains with the operator and compliance with these suggestions will not necessarily mean that all avenues of contamination have been eliminated. Operators should therefore be alert for any other sources of filth.

EDITOR'S NOTE: The check list was prepared jointly by the Food and Drug Administration and the U.S. Department of Health, Education and Welfare and the sanitation committee of the Grain and Feed Dealers National Assn. in consultation with the Bureau of Entomology and Plant Quarantine of the U.S. Department of Agriculture and the Fish and Wildlife Service of the U.S. Department of the Interior. Issued some years ago, it is the form still used by FDA in its inspection work.

Here is what to do:

1. Keep the rats and mice out. Depending upon the present condition of your elevator, this may involve:

a. A poisoning and trapping program to eliminate all rodents already present. Check from dump and elevator boot pits and tunnel to headhouse, outside and inside.

b. Filling and closing of rodent tunnels under foundations: flashing or otherwise permanently closing rat and mouse holes in bins; construction of rodent-proof covers for any horizontal screw conveyors or other equipment accessible to rodents from the outside.

c. Clean up of nearby rodent harborages such as grain refuse piles, trash dumps, lumber or woodpiles, etc., which may serve as a source of rodent population in the elevator. Mixed feed or other warehouse storage may also constitute a rat or mouse harborage and must be cleaned up and rodent proofed at the same time. Many rodent problems involve the entire community. Control in adjacent areas will facilitate the handling of your problems. Pile grain doors on supports at least 14 in. off the ground.

d. Remove all unused and discarded pieces of equipment, old bags.

e. Regular inspection of the elevator premises for evidence of reinfestation, and location and correction of the source where such evidence is found.

Rats and mice contaminate grain with excreta pellets, urine and hairs. This contamination cannot be completely removed. It must be prevented.

2. Keep the insects out. This means:

a. Make sure an "empty" bin is completely free of old grain, dust or

Check List for Elevators Handling Food Grains

I. CONSTRUCTION

NOTE: The construction items herein indicate only the relative ease or difficulty with which the elevator is going to be able to protect its grain from contamination. Action by the Food and Drug Administration will not result from poor construction features alone, if there is no insect or rodent or bird problem, or other source of contamination with filth.

	Yes	No
a. Bins or house covered and sufficiently tight for good fumigation	___	___
b. Bin walls reasonably free from cracks, insect tunneling or ledges where insects may live or where old grain may accumulate and become infested	___	___
c. Bin hoppers self-emptying, or if not, bin floors accessible for inspection and cleaning	___	___
d. Elevators, including boots, legs and heads and conveyors and spouting accessible for inspection and cleaning	___	___
e. Headhouse and gallery floors, catwalks, eaves, machinery housings and framing members or other ledges at top of elevator accessible for removal of grain and dust residues which may become infested	___	___
f. Windows screened to exclude birds	___	___
g. Bins rodent proof	___	___
h. Conveying and cleaning equipment rodent proof or in a location inaccessible to rodents	___	___
i. Adequate measures taken to protect grain dump pits from rodent entry	___	___
j. Construction otherwise adequate to exclude rodents and adequate in other respects	___	___

Remarks: .....

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II. PRESENT CONDITION

	Yes	No
a. Grain in bins free from live infestation and evidence of active rodent or bird contamination	___	___
b. Empty bins clean—free from grain, dust or other residues and insects in cracks, on ledges in bin hoppers, etc.	___	___
c. Headhouse and gallery floor, catwalks, eaves and other machinery housings and framing members or other ledges at top of elevator free from insects and grain and dust accumulation or other insect harborages	___	___
d. Elevator legs, boots and heads, including tunnel or pit and horizontal conveyors, spouting and grain cleaning equipment free from insects and accumulations of old grain and dust	___	___
e. Elevator premises free from old grain residues or other harborages	___	___

f. Entire elevator free of evidence of rodent traffic:

	Yes	No		Yes	No
(1) Grain dump pit	___	___	(2) Elevator boot, pit and/or tunnel	___	___
(3) Empty bins	___	___	(5) Feed mill	___	___
(4) Headh'se & Gall.	___	___	(7) Ext. of premises	___	___
(6) Warehouse	___	___			
(8) Other	___	___			

Remarks: .....

g. Entire elevator free of other sources of grain contamination including bird	___	___

Remarks: .....

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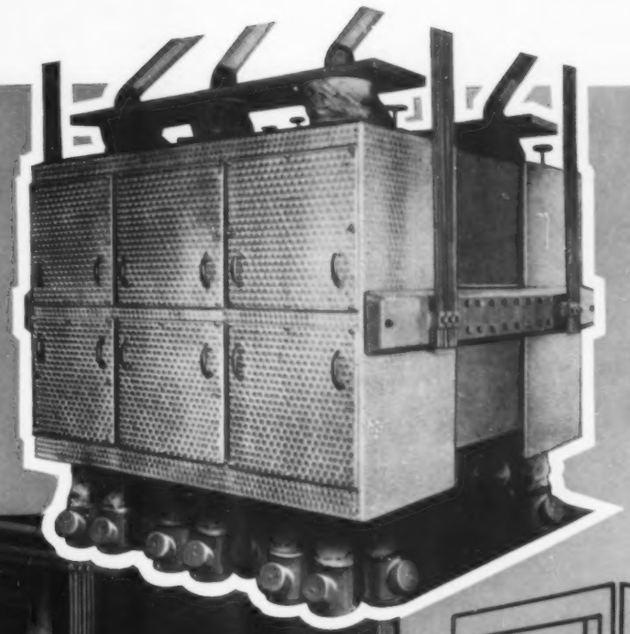

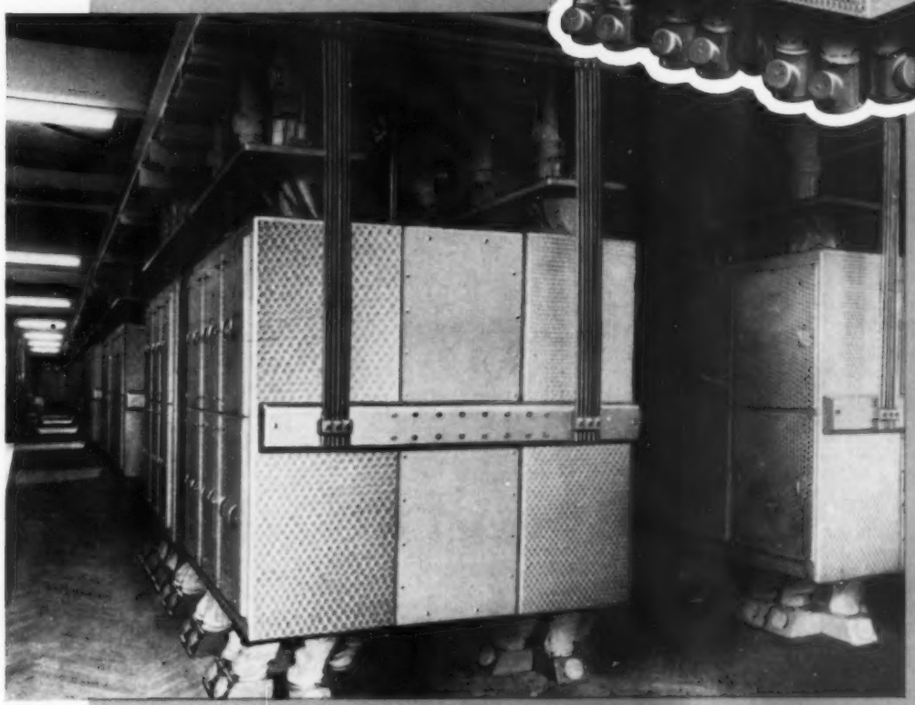

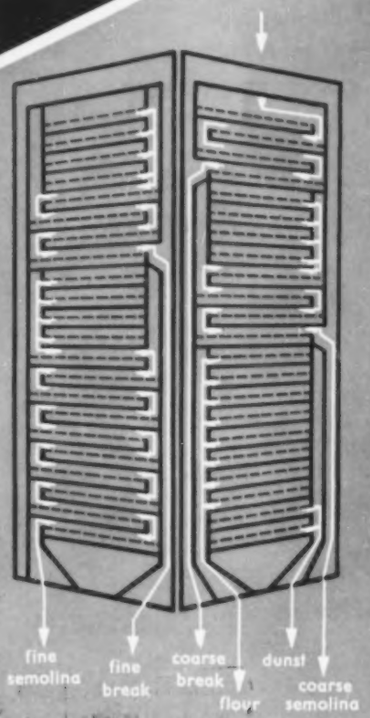

Principle Flow of Products in a Sifter Section

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III. PROGRAM

a. Inspection of incoming and outgoing grain for contamination	——	——
b. Frequent periodic sampling and examination of grain in storage for live infestation (every two weeks during warm weather, every month in cold weather)	——	——
c. Immediate fumigation if live infestation is found	——	——
d. Thorough cleaning of empty bins before refilling if bins not completely self-emptying	——	——
e. At least bi-weekly clean-out of boots, conveyors, etc., and removal of grain and dust from floors and ledges	——	——
f. Weekly check of entire elevator for refuse or other debris which might serve as insect or rodent harborage	——	——
g. Weekly check of both exterior and interior, including feed mill and warehouse, for evidence of rodent traffic	——	——
h. Location and elimination of source if any evidence of rodent traffic	——	——
i. Adequate handling of infested grain and cleanings to prevent spread of live infestation	——	——
j. Inspection of box cars for infestation or possibly infested grain residues before loading	——	——
k. Periodic check of entire elevator for any other avenues of contamination	——	——

Remarks: .....

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(Food and Drug Inspector)

Note: The information herein is furnished in accordance with the provision of Sec. 704(b) of the Federal Food, Drug and Cosmetic Act (21 U.S.C. 374 (b) Sec. 301 (n) of that Act (21 U.S.C. 331 (n) makes the using, in labeling, advertising or other sales promotion of any reference to any report or analysis furnished in compliance with Sec. 704 (21 U.S.C. 374), a prohibited act.
FD—483a April, 1957.

other residue which may become insect infested before you put clean grain into it. This is much easier if:

(1) Walls are reasonably smooth and free of cracks, ledges or insect tunneling where old grain remains when bin is emptied.

(2) Bins have hopper type self emptying bottoms. If the bin contains ledges, cracks, or other "grain traps" in or on which old and possibly infested grain accumulates, eliminate these insofar as possible by repair or new construction. If they cannot be eliminated in this way, or if the bin has a flat bottom, the next best thing is a thorough cleaning of the bin each time it is emptied, by sweeping, vacuum cleaning or other steps necessary to remove all of the grain. If this is not done, the residue which remains may become infested and serve to infest every subsequent lot of grain which passes through the bin. It is these pockets of old grain which continue to spread the infestation.

b. Make sure your elevator boots, legs and head, and horizontal conveyors and spouting are free from infested grain residues. Bear in mind that a small amount of insect-infested grain in grain handling equipment can start infestation in a lot of clean grain. Infestation started in this manner may ruin the clean grain if mixed with other grain and may result in loss of many hundreds or even thousands of bushels. Even if only apparently clean grain is handled, elevator boots and other equipment which is not completely self emptying should be cleaned at least every 2 weeks.

c. Keep your gallery and headhouse floors, catwalks over bins, flat space under the eaves around edges of bins, structural members and other flat surfaces near the top of the elevators, free from old grain and dust residue. Such residues often become infested and infestation can readily spread from these points into the bins. By all means do not sweep old grain residues from these points into bins of food grains.

d. Practice ordinary good housekeeping. Do not permit old grain residues to accumulate anywhere in the elevator or on the nearby premises, even though not in direct contact with stored grain or grain moving equipment. Insects can crawl and fly, and if they are present in grain residues, in or around the elevator, you may be sure they will find their way into stored grain.

e. Make frequent periodic checks of your grain in storage, at least every two weeks in warm weather and once a month in cold weather, to make sure no live infestation has appeared. Bin inspections should be carried out on a definite schedule. Do not depend upon heating of the grain to bring this to your attention. Once the grain has begun to heat because of infestation, it is probably very heavily contaminated. Whenever any live infestation is discovered—fumigate.

3. Keep the birds out—If the windows or other openings in the elevator must be open for ventilation, cover them with hardware cloth, to exclude birds. Bird contamination is just as repulsive as insect or rodent contamination. Cleanup of spilled grain will make the area less attractive to rodents and birds.

4. Do not contaminate clean grain by adding contaminated grain to it. Grain that is unfit for food use cannot be made fit by diluting the contamination with clean grain. A great deal of contamination occurs in farm storage. Filthy grain should not be added to food grain.

Elevator operators can examine wheat for rat and mouse pellets, for live or dead insects and for kernels with insect damage, without any special training or equipment. If live insects are found in incoming grain the grain should be fumigated. The grain should then be carefully watched for at least a week in warm weather and longer in cool weather, to make sure that the fumigation was effective. If no live insects appear, the grain may be examined for insect damaged kernels and rodent pellets to determine whether it may be binned as food grain. (If this grain were dumped into a bin of clean grain, even for animal feed, any insects which may have escaped the fumigation will develop and damage the clean grain.)

The check list should bring your attention to sources of contamination in your elevator. You may use it as a guide in setting up a continuing sanitation program.

——BREAD IS THE STAFF OF LIFE——

Radio-Frequency Energy Could Control Insects In Stored Grain

WASHINGTON—Control of stored-grain insects with heat from radio-frequency electric fields is a future possibility described by a U.S. Department of Agriculture engineer at a recent meeting of the American Society of Agricultural Engineers at Ithaca, N. Y. Application of the method on a large scale will depend, he said, on further equipment development and experimentation.

Scientists have known for several years that stored-grain insects can be killed by brief exposure to radio-frequency energy. The method has not been developed for commercial use because of high treating costs per bushel of grain. But Stuart O. Nelson of USDA's Agricultural Research Service, in telling the engineers' 52nd annual meeting of recent promising experiments, cited reasons for attempting to make the method economically practical.

Advantages of fast kill of most stored grain insects (within a few seconds) without damage to the grain, and adaptability of the method to continuous processing favor its development, he said. However, the experimental unit, while promising, should not be regarded as suitable for commercial grain processing, Mr. Nelson pointed out, because of its present low capacity of 400 bu. of grain per hour.

In addition, a liberal estimate of a large-scale treating cost of 3½¢ bu., determined by using the experimental equipment and considering power costs, depreciation, interest, and maintenance, still cannot compete with costs of fumigating stored-grain to control insects, Mr. Nelson added.

By adapting components available on the market, Mr. Nelson and W. Keith Whitney of the Kansas Agricultural Experiment Station developed experimental equipment that quickly killed all of several species of insects in stored wheat and wheat shorts. Cooperating were USDA's Agricultural Marketing Service and the Nebraska Agricultural Experiment Station. They killed rice and granary weevils, flour beetles, dermestid beetles, and lesser grain borers by brief exposure to radio frequencies of 10 and 39 megacycles per second and field intensities of 1.2 to 3.6 kilovolts per inch.

High-energy treatments necessary to kill all of these insects produced temperatures of 140 to 150 degrees that do not damage wheat of 14% moisture content. Higher temperatures may be needed to kill other stored-grain insects.

USDA Scientist Finds Exception To Established Law of Heredity

WASHINGTON—One of the established laws of heredity, which has been accepted for almost 100 years, does not always apply to corn, according to basic research by a U.S. Department of Agriculture scientist.

Edward H. Coe, Jr., of USDA's Agricultural Research Service, cooperating with the Missouri Agricultural Experiment Station, found that a certain gene, the unit that controls heredity, is modified in its action by another gene. This differs with the well-known Mendelian Law that states that a gene never loses its identity even though the characteristic it determines may be masked by a dominant partner gene called an allele.

Effect Eliminated

In crossing a corn plant of intense-red color with another having weak-red color, the weak-red gene has the ability to eliminate the effect of the intense-red gene. This gene is converted to weak-red by the gene that controls the weak-red color.

Under the normal rules of heredity the second generation, resulting from a cross between the two types, should consist of one plant genetically similar to each of the original parents and two like the first generation. However, this new-found gene action results in all the second generation plants being like one of the parents, in this case weak-red. The failure of the intense-red to appear in the second generation eliminates the possibility of this phenomenon being caused by simple dominance.

To eliminate the possibility of cytoplasmic inheritance (inheritance carried by cell body rather than by genes), Mr. Coe used an intense-red plant as the male, but again only weak-red plants resulted. Most of the cytoplasm, the material surrounding the cell nucleus, is provided by the female parent.

Attempts to recover the intense-red factor through self-pollination or backcrossing also were unsuccessful. The conversion to the weak-red color apparently is permanent.

Crosses between the normally dominant weak-red plants and plants with the recessive for no color (normal green) gave normal segregation in the second generation. This showed the weak-red gene was transmitted from one generation to the next by normal means along with the other genes. This was further backed through the use of marker genes on the same chromosome that showed up in the second generation according to normal segregation.

To show that the loss of the expression of the intense-red gene was not caused by irregular transmission, Mr. Coe crossed intense-red plants with plants containing both the gene for weak-red and the gene for no color. As expected the second generation resulted in half intense-red plants, and half weak-red plants consisting of normal weak-reds and intense-red converted to weak-reds.

Self pollination of these plants showed the intense-red characteristic could be recovered only from plants in which the intense-red was combined with the factor for no color. Weak-red plants continued to produce weak-red plants.

Further tests under way on this phenomenon will increase man's knowledge of the action of genes on hereditary charactistics, Mr. Coe said. The application of this information will assist plant breeders in their work.

BRITISH MILLERS END QUOTA PLAN

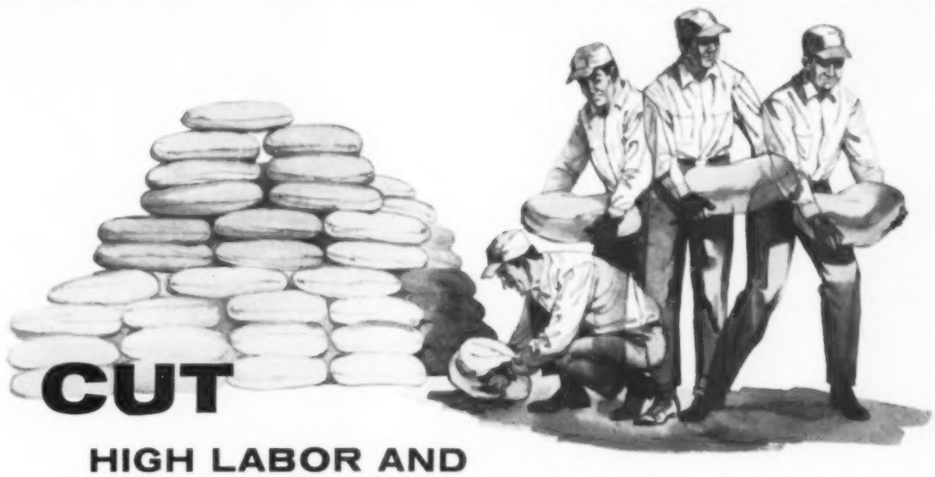
★

LONDON — The British millers have decided to end their quota rationalization scheme, operated under the auspices of the Millers Mutual Assn. The scheme is a voluntary arrangement between millers for rationing the output of flour to match potential requirements and was worked out in the 1930's when the British milling industry was suffering acute depression. One of the leaders at the time was the late James V. Rank of the mammoth Ranks flour milling group, the largest in Britain. Recently, the millers dropped their price agreements which had been maintained for several years through regional associations.

36 Feed Firms Install New Mill Equipment

CHICAGO — A total of 36 feed firms in 13 states have recently installed Prater Pulverizer Co. Blue Streak equipment, the Chicago company has announced.

The states, and numbers of firms with new installations, are as follows: Kansas, two; Illinois, 11; Indiana, two; Michigan, three; Ohio, one; Minnesota, four; Virginia, one; Missouri, two; Iowa, two; Wisconsin, four; North Carolina, one; Washington, two, and South Dakota, one.



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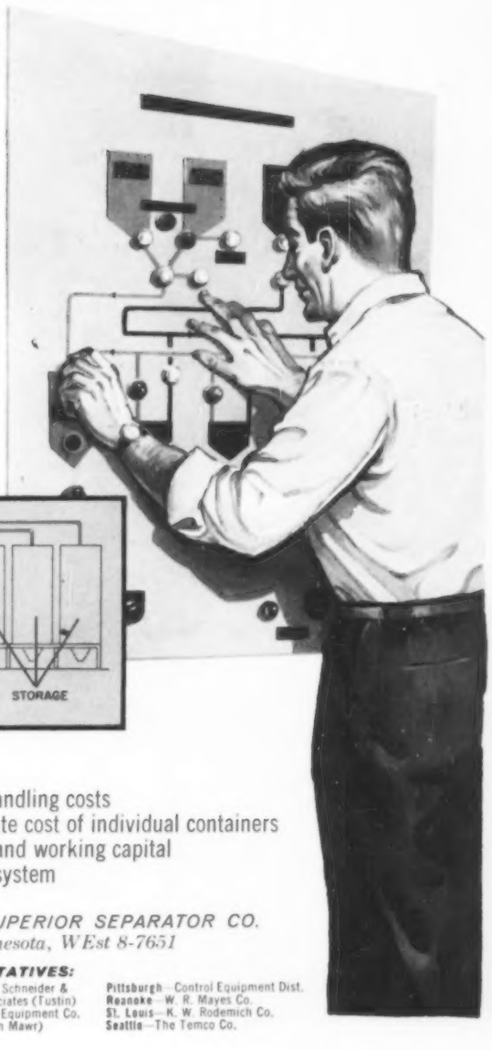

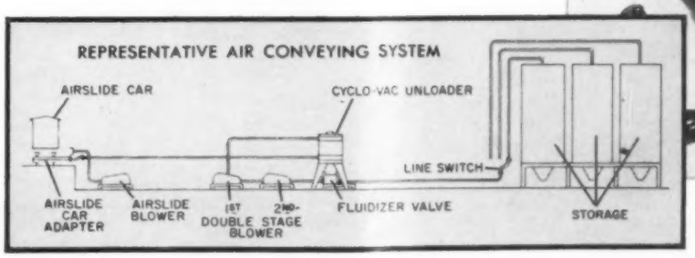

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Here's How to Get Most Out of Your Control Devices

Failure to recognize and correct early trouble symptoms can become expensive

By H. A. Wright

If water, sludging or excess carbon is present in high-voltage, oil-immersed contactors, new oil should be used. Check contact tips when inspecting oil for presence of carbon, etc.

MOST electrical control devices, be it a motor starter, switch or integral control, will give trouble-free service provided they are properly applied, have an adequate electrical system and are correctly maintained.

Since most control devices have moving parts, failure to recognize and correct early trouble symptoms can lead to a chain reaction which could result in disproportionate maintenance costs or in complete replacement.

Only skilled personnel familiar with electrical equipment and the hazards involved should be permitted to service control units. All safety precautions should be observed, not only on the electrical equipment but on the driven machines as well. A periodic inspection schedule and precautionary maintenance program will result in savings in replacement parts and down time of machines.

Dust, dirt and grease should be removed periodically from the controller. Dust can cause mechanical failure and it may form a path between points of different potential, resulting in a short circuit. Dry dust can be blown off; sticky dust and grease are best removed with commercial solvent. Care should be taken when using solvents so the coils do not become soaked. Special attention also must be paid to rust and corrosion, particularly on thermal overload relays.

Moving mechanical parts should be free from excess friction. The parts should be tried by hand to locate any loose pins, bolts, etc. Wearing parts should also be checked for excessive wear. The bearings on electrical control equipment are designed to operate without lubrication. If oiled or greased, dirt will accumulate and cause sluggish action and possible failure.

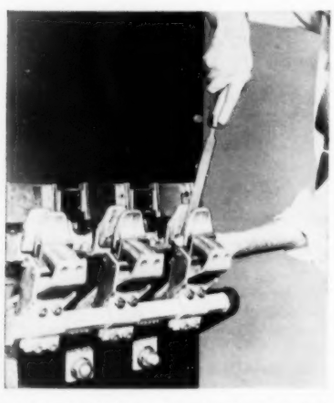
Overheated parts are always a sign of trouble. Since various parts operate at different temperatures, it may be difficult to locate this trouble. For example, coils, blow-out coils, and other parts of the contactor may operate at a temperature which would boil water, hence these parts cannot be touched. Any evidence of baking or smoking, however, should be cause of immediate attention.

EDITOR'S NOTE: Mr. Wright is supervisory engineer of general purpose starters in the control department of Allis-Chalmers Mfg. Co.

Loose connections, always a source of trouble, may develop at any time. Therefore, control connections should be checked periodically along with the main line connections.

The best way to check for grounds which may develop is to megger the cables and conduits periodically. This is especially necessary if water could collect in the conduit.

Contactors need the most care.



Although pitting of contacts does not affect their operation, deposits must be removed. When dressing contact tips, the original contact shape must be retained.

PREVENTIVE MAINTENANCE CHECK LIST

Date ..... Tool No. ..... Voltage .....

Serial No. ..... Hp ..... Location .....

Pull disconnect switch before working on control

Check	Item	Operation
☐	**Dust**	Clean.
☐	**Rust and Corrosion**	Clean—Report if excessive.
☐	**Connections**	Tighten electrical connections, look for discoloration of any copper current carrying parts.
☐	**Nuts and Bolts**	Check mechanical connections.
☐	**Fuse clips**	Check for spring clip pressure.
☐	**Fuse ferrules**	If copper, polish; loose ferrules and proper size fuses.
☐	**Contact tips**	Look for copper oxide scale, dress only if necessary. Check roll and wipe.
☐	**Contact pressure**	Check contact pressure, is pressure same on all tips.
☐	**Flexible leads**	Look for frayed and broken strands, flexing over entire length.
☐	**Bearings**	Do not oil, are they free moving.
☐	**Coils**	Check for any signs of overheating or mechanical injury.
☐	**Magnets**	Clean faces, check shading coil, misalignment, mechanical binding, striking coil.
☐	**Overload relays**	Trip by hand, mechanically free, clean, check heater coil and tighten all connections.
☐	**Arc shields**	Check for breaks and burning.
☐	**Blowout coils**	Check for overheating and tighten.
☐	**Dash pots**	Free; clean, if oil type, check oil level.
☐	**Push Button or selector switch**	Clean, check contacts.
☐	**Relays**	Clean and check for mechanical binding and sticking. Check contacts.
☐	**Resistors**	Check for signs of overheating, if sliders tighten.
☐	**Oil Immersed Devices**	Drain small quantity from bottom to remove sludge, if much sludge, drain oil and clean. Check level and add, replace oil if black and dirty; check contactor and wipe off carbon.
☐	**Drum Controllers**	Tighten and check for contact wear and overheating, put small amount of vaseline on sliding surfaces.
☐	**Pilot Devices**	Clean and check contacts.
	START THE MOTOR OBSERVING ALL SAFETY PRECAUTIONS FOR DRIVEN MACHINES.	
☐	**Check starting sequence**	Does the control function properly.
☐	**Contactors**	Flash on closing, if so, check for adjustment to eliminate contact bounce.
☐	**Noise**	Check shading coils, magnet surface, sealing, mechanical binding, loose rivets.
☐	**Pilot Devices, Pressure Switches Temp. Switches**	Check bottom and top limits of operation. Is there any fluttering of contacts denoted by pumping of main contacts.

List any parts which will have to be replaced in the near future.

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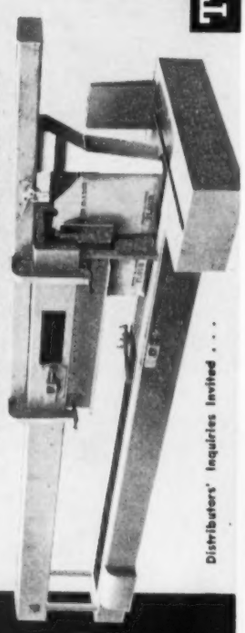

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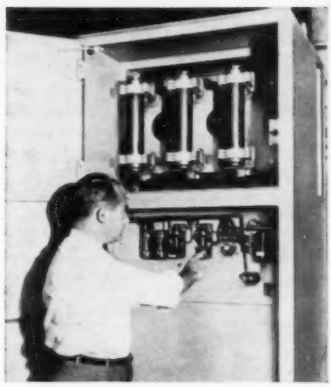
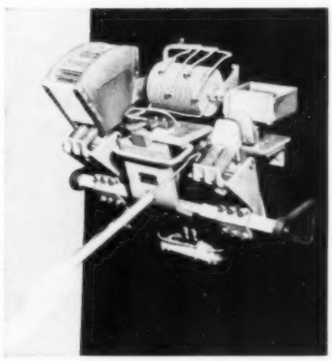


Thermal overload relays should be reset or maintained only by experienced electrical men.

Their bearings should be checked for free operation but not lubricated. Deposits on contacts should be removed with either sand paper or a fine file. Never use emery paper because it imbeds in the contact face and continues to wear. In filing, care should be taken to maintain the original shape of the contact, but do not overdo. While copper oxide should be removed because it is an insulator, trying to keep them smooth only wastes the material of the contact surface. Silver contacts should never be filed unless they become severely roughened. Silver oxide is a good conductor and does not need to be removed. When contacts are deeply pitted, burned or worn thin, they should be replaced in sets with new ones. Screws holding the contacts in place should be kept tight at all times.

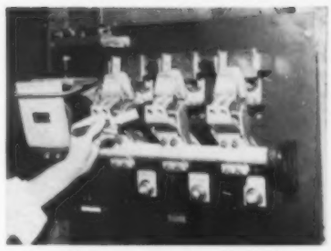


Initial spring tension should be checked with a scale in accordance with the manufacturer's recommendation. Final contact pressure should be checked at contact heel in a similar manner except with the magnet in the closed position.

Springs maintain the proper contact pressure. If contacts are permitted to wear too thin, spring pressure decreases and overheating results. This generally causes the spring to lose its temper, further decreasing the contact pressure. Spring tension should be checked with a scale in accordance with the manufacturer's recommendation. If a scale is not available, a comparison test could be made between the installed spring and a new one of the same design. Where neither of these tests is possible, springs may be checked by compressing with the fingers to determine whether one is weaker than the others. A good rule to follow is to replace contact springs when replacing contacts.

Coil Failure

New methods of impregnation have greatly reduced coil burn-outs. However, in the event of A.C. coil failure, the contactor should be checked for mechanical binding or blocking. For example, an A.C. contactor coil may have a 47 ampere inrush valve with the magnet open, and 1.7 amperes with the magnet closed in the sealed position. If the magnet is ac-



Dust, dirt and grease must be removed periodically from the controller. Dry dust may be blown off or brushed, as shown.

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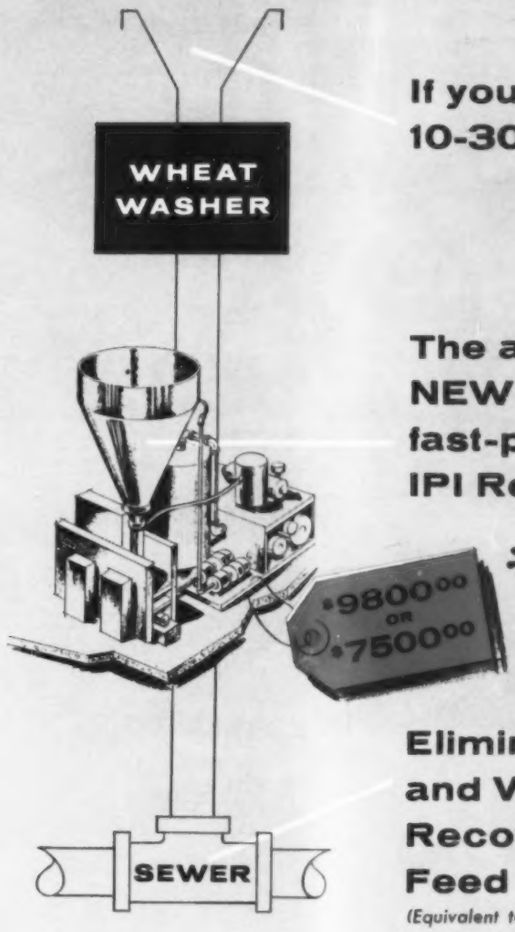

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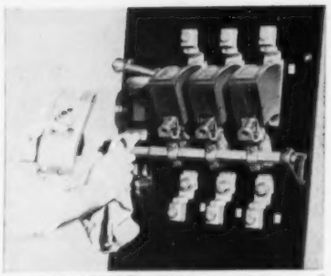
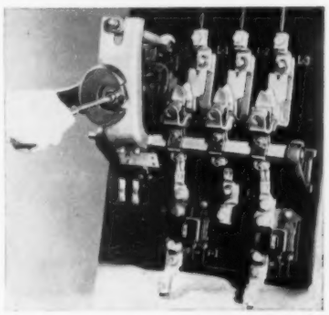


When cleaning the magnet assembly with a solvent, don't let the coils become soaked. Care should also be taken to prevent breakage of auxiliary movable contacts when the magnet assembly is dropped open.



To insure perfect sealing and alignment of armature with the magnet adjust screw as shown. Be sure armature closes simultaneously on top and bottom legs of "E" frame.

c'dentally blocked open, or the voltage is so low that the magnet cannot seal against the contact springs, the current will be high, causing a burn-out.

Connectors made of fine stranded wire are subject to repeated flexing. Eventually some of the strands may break and the current increased on the remaining strands. In such instances the lead should be replaced. New leads should be formed by hand so they will take the flexing over the entire length rather than at one point.

Arc shields should be checked to make sure they are in place and not obstructed with dirt. If severely coated with carbon or copper deposits, they should be cleaned.

Some controllers have dashpots which may be air or liquid filled. If oil-filled dashpots, only special dashpot oil should be used. The dashpots should be checked to make sure they are not sticking or binding.

The oil on high voltage oil-immersed contactors and circuit breakers should be maintained at the recommended level, and should be periodically inspected for water, sludging and excess carbon.

Some of the most frequent difficulties common to most electrical control devices are pin-pointed in the trouble-shooting chart accompanying this article. Also shown is a preventive maintenance check list to serve as a guide in setting up a thorough maintenance program.

Proper installation and maintenance of control is vital to its ability to perform satisfactorily. Checking the line voltage is a wise precaution. Low voltage is apt to show up especially during starting.

CONTROL TROUBLE-SHOOTING CHART

SYMPTOM	POSSIBLE CAUSE	CURE
MANUALLY OPERATED CONTROLLERS		
Excessive Contact Burning.	Low contact pressure, contacts not properly aligned	Adjustment by inspection. On drum controllers adjust star wheel lever spring to center the finger so it strikes the contact squarely.
Burning Out Resistors.....	Starting sequence stopped at mid-point	Instruct operator.
Failure to Pick Up.....	Low voltage on coil	Check system.
Failure to Hold In.....	Coil burned out, or wrong coil	Replace.
	Excessive magnet gap	Check gap.
Failure to Drop Out.....	Mechanical binding	Clean and adjust.
	Contact welded	See Contacts.
	Voltage not removed	Check circuit.
THERMAL OVERLOAD RELAYS		
Failure to Trip.....	Wrong size heater	Check instruction sheets.
	Mechanical binding	Clean and adjust.
	Relay damaged by short circuits	Replace relay.
	Motor and relay in different ambient temperatures	Install motor and control in uniform temperature.
Trips at too Low Current...	Wrong heater	Check instruction sheets.
	Heater assembled incorrectly	Check instructions.
	Heater in high ambient	Install relay and controller near motor or in cooler place.
	Wrong calibration	Refer to factory.
Trips on Starting.....	Starting cycle of motor too long	Refer to factory.
Failure to Reset.....	Broken mechanism	Replace relay or broken part.
Burning of Relay Contacts.	Short circuit	Check wiring of push-button in the circuit.
	High coil current	Check holding coil current
	Vibration	Remount control.
	Dirt and corrosion	Clean and adjust.
	Misapplication	Use interposing relay if handling too high coil currents for relay contacts.
CONTACTS		
Short Contact Life.....	Interrupting too high a current	Use special tips or next larger size contactor
	Using oil immersed device when air should be used (Note: Contacts burn many times faster in oil than in air.)	Use air break device if oil is not necessary or if oil is imperative, try heavier duty oil-immersed device.
	"Bounce" on opening or closing	Readjust contactor for "bounce."
	Abrasive dust	Dust tight enclosure
	Low contact pressure	New contacts and/or springs.
	Frequent jogging	Larger size contactor.
Contact Chatter or Pumping	Poor contact in control circuit	Check connections in control circuit.
	Fluttering control relay, such as pressure or temperature switch	Repair pilot device.
	Broken shading coil	Replace.
	Bad interlock	Increase wipe and pressure on sealing interlock.
Overheating.....	Copper oxide	Clean lightly with file.
	Heavy load for more than eight hours continuous operation	Use silver alloy tips.
	Overloaded	Reduce load or use larger control.
	Weak contact pressure	Clean and adjust. Replace contact spring and contact if wear allowance is used up.
	Poor connection	Tighten.
Weak Pressure.....	Worn tips	New tips.
	Poor adjustment	Readjust gap and wear allowance.
	Low voltage, magnet not sealing	Correct voltage, use lower voltage coil.
Welding of Contacts.....	Poor spring pressure	New springs.
	Abnormal currents	Less current, larger device or non-welding contact tips.
	Repeated jogging or inching	Controllers must be derated for jogging duty due to severe strain.
		Use next larger device or tell operator to jog more slowly. Special alloy tips may also help.
	Low Voltage—Contact may drop part way open on slow dips of voltage	Raise voltage.
	Bouncing of contactor	Eliminate overvoltage and/or mechanical difficulties.
COILS		
Open Circuit.....	Contacts not sealing	Eliminate mechanical binding of contactor.
	Failure to insert protective resistor on dc	Interlock not making contact—
		Repair interlock.
	Mechanical injury	Replace coil; use more care.
	Very rapid jogging	Check application.
	Short time rated coil energized too long	Check timing sequence.
	Overvoltage and/or high ambient	Check circuit and application.
Coil Failure.....	Moisture or corrosive atmosphere	Special coils.
SLIDING CONTACTS Used on rheostats, knife and drum switches		
Overheating.....	Overcurrent, weak contact pressure	Dress copper contacts or use special alloy contacts. Lubricate contacts periodically as recommended.
Excessive Burning.....	Rapid lever operation	Operate more slowly to eliminate starting across the line which causes burning of contact surfaces and flash-over.
Irregular Surfaces.....	Lack of maintenance	Smooth over contact surface and lubricate. Do not use emery cloth.
Abrasion.....	Lack of lubrication	Apply light coat of vaseline.
MAGNETS		
Noisy.....	Low Voltage	Raise voltage or use lower voltage coil.
	Broken shading coil	New shading coil or if face of magnet is worn down, install new magnet frame.
	Dirt	Clean sealing surface of the magnet and bearing points; lubricate with good grade of white machine oil.
	Misalignment	Realign.
Fail to Open.....	Grease on magnet surface	Clean.
	Misalignment	Realign.
	Contacts welded	(See contact welding).

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Kansas Farmers Will Exchange Wheat for European Equipment

MANHATTAN, KANSAS—Kansas and Midwest farmers, rather than being isolationists, may be leading the nation toward more international trade and foreign commitments.

Dr. John A. Shellenberger, head of the flour and feed milling industries department at Kansas State University, points out that it is Kansas farmers, working through their cooperative elevators, who are spearheading a drive to trade wheat for experimental milling equipment in Europe.

Dr. Shellenberger has made arrangements in Europe for this trade in order to replace some of the equipment destroyed by fire in 1957. Kansas wheat farmers are anxious for Europeans to recognize the high quality of their product. Cooperative commission companies and their member elevators have agreed to accept farmers' wheat consigned to Europe.

Dr. Shellenberger says that though the wheat is a direct contribution by farmers, their gifts may come back multiplied many times because Europeans need wheat like that grown in Kansas to blend with the softer wheats they grow.

The international arrangement involving Kansas and Midwest farmers is one that should be beneficial to Europe, to our farmers and to Kansas State University, Dr. Shellenberger said. The farmers need the European market, and the university needs the experimental equipment that European firms can supply.

Though the experimental equipment will be used for research, student training and for marketing studies, the goal of all those activities is to improve the wheat situation, Dr. Shellenberger said.

Besides indicating that the Midwest has lost its old "isolationist" tag, the program also indicates that Kansas farmers are trying to do something for themselves through research that could be much more long-lasting than changeable goverrmental farm programs have proved to be.

To make it easy for farmers to contribute "a bushel for research," elevator companies accept telephone calls, post cards, letters or personal instructions of farmers who help boost the "barter for research" that takes high-quality wheat from the Midwest to Europe.

——BREAD IS THE STAFF OF LIFE——

Corn Products Earnings Ahead in First Half Of Current Year

NEW YORK—Net sales and earnings per share for the first six months of 1959 for Corn Products Co. were ahead of the comparable period of last year, according to figures reported to stockholders by William T. Brady, president.

Net sales of the company and its domestic and Canadian subsidiaries for the half-year ended June 30, 1959, were $237,452,793, as compared with $227,493,813 for the first six months of 1958. Results of both years shown include the operations of the company's Best Foods division.

Net income after taxes applicable to common shares was $13,184,858, as against $12,771,191 reported for the similar period in 1958. This is equivalent to $1.21 a common share on 10,886,131 shares outstanding this year, as compared with $1.18 a share on 10,790,918 shares outstanding at the half-year mark last year.

Pfizer Six-Month Sales Establish New Peak; Earnings Down Slightly

NEW YORK—Sales of Chas. Pfizer & Co., Inc., for the first six months established a new record, but earnings were down slightly, share owners were told in the semi-annual report issued recently.

World-wide sales of the drug and chemical firm in the first half amounted to $122,898,523, an increase of 15% over the total of $106,943,269 in the same period last year. Earnings were off slightly, from $11,582,770 to $11,396,898, and were equivalent to 69¢ a share of common stock against 71¢ in the first six months of 1958, adjusted for the recent three-for-one split. Common shares outstanding at the end of the first half just completed totaled 16,245,568, compared with an adjusted total of 16,115,928 a year ago.

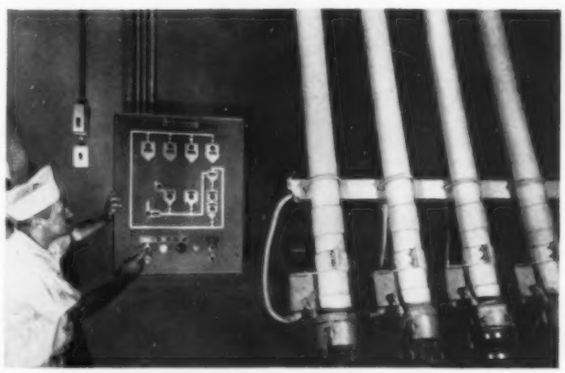
In a message to share owners, John E. McKeen, president, said: "All our plants are operating at full capacity as a result of a heavy demand for a variety of Pfizer products and we anticipate that operations will be maintained at this rate for the balance of the year. We estimate that sales will continue to show a year-to-year gain in the second half and hope that some of the newer products will prove to be significant advances in medical therapy."

——BREAD IS THE STAFF OF LIFE——

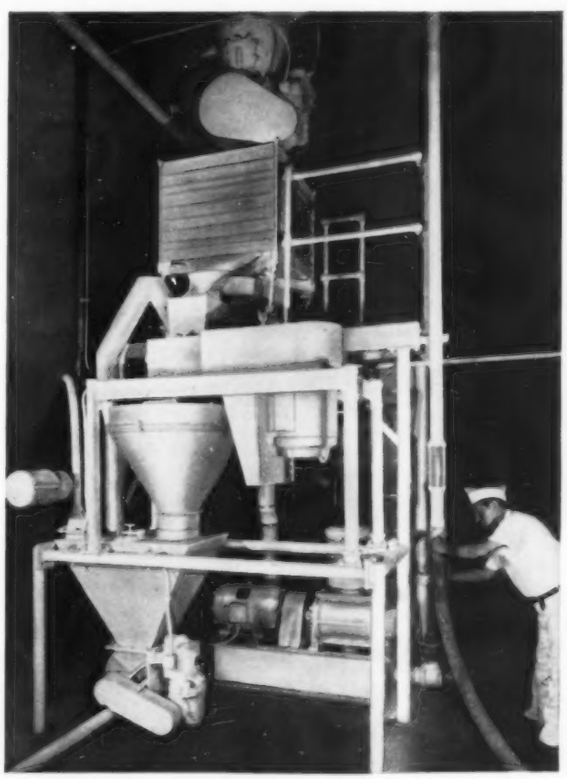
FRENCH WHEAT OUTPUT

PARIS—Wheat output estimates in France for 1959 are officially set at 404 million bushels, compared with 350 million bushels harvested in 1958. The estimated yield of 36.8 bu. acre is the highest yet recorded in France, and may be compared with the previous record of 35.3 bu. acre in 1957.

The Arithmetic of Materials Handling



Central Control Panel of Jewel Tea's flour-handling system. At right are main conveying lines—each to a separate bin.



FULLER

Pneumatic Conveying System Provides Low Cost, Sanitary Flour Handling Method For New Jewel Tea Co., Inc. Bakery

Automation . . . at the new Jewel Tea Company bakery in Melrose Park, Ill., . . . means baking more than four tons of bread an hour under the highest standards of sanitation, at the lowest possible production cost. A Fuller-engineered *pneumatic* flour-conveying system helps make this record performance possible.

This automatic, smooth running pneumatic conveying system is controlled by one man and a centrally located push-button control panel. By making a simple connection, turning a switch and pressing a button, the operator empties 100,000 lb. GACX Airslide carloads, of bulk flour, into storage bins. Other buttons send the flour through predetermined cycles of sifting, weighing, mixing — in dust-tight, self-cleaning pneumatic lines.

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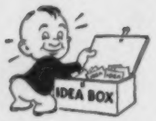


New Products
New Services
New Literature

This reader service department announces the development of new and improved products, new services and new literature offered by manufacturers and suppliers. Claims made in this department are those of the firm concerned. Use the accompanying coupon to obtain the desired information.

No. 2136—New Shovel-Barrow

A new combination shovel and wheelbarrow suitable for handling grain and feed in cereal and grain processing plants and elevators has been announced by the Gar-Bro Manufacturing Co., maker of materials handling equipment for building construction and industrial applications.

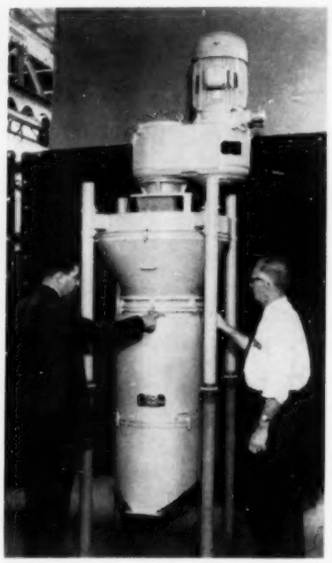
In effect, this is a giant-size dust pan. It can be loaded without shoveling since the bottom of the tray is at floor level and can be pushed directly into the grain or other bulk material. The shovel-barrow is of all welded steel construction and is equipped with ball bearing wheels and cushion rubber tires. Tray width is 24 in.; length 30 in. Overall width of the cart is 34 in. Net weight is 65 lb. For further information check No. 2136 on the coupon.

No. 2138—Folder on Checkweigher

A new, illustrative four-page folder describing the latest development in heavy duty, high speed checkweighing is announced by Toledo Scale, division of Toledo Scale Corp. The literature illustrates and describes the features and advantages of the new Toledo Model 9460 Automatic Checkweigher. It is pointed out that this Toledo checkweigher handles bags, boxes, packages, slabs, blocks and other items, while in motion, within a weight range of 50 lb. to 200 lb. The zone widths may be varied from approximately 2 to 8 ounces, with a zone edge accuracy of plus or minus ⅓ ounce. One hundred percent in-line checkweighing speeds up to 40 items per minute can be attained. The simplified methods of precision adjustments and weight settings are also described. Optional accessories described in this folder include automatic pilot lights and numerical counters. Check No. 2138 on the coupon for more information.

No. 2137—New Scourer-Aspirator

A new model scourer-aspirator with a larger rotor is now available from the Entoleter Division of Safety Industries, Inc. The new machine is designed so that it can be mounted



from the ceiling if desired, to save floor space in wheat mills. The new scourer-aspirator has a 27 in. rotor, a 10 h.p. motor and can process 10,000 lb. of grain per hour operating at 2300 rpm. The largest Entoleter scourer-aspirator previously available had a 16 in. rotor. It could subject the material processed to a maximum impact velocity of 14,000 ft. per minute. The new 27 in. model can subject the material to velocities as high as 25,000 ft. per minute. Check No. 2137 on the coupon for more information.

No. 7548—Electronic Weight Detector

An electronic weight detector for application to the manufacturer's dial scales has been announced by Fairbanks, Morse & Co. The unit is designed to provide the bridge between manually controlled and fully automatic weighing processes. Previously, the only method of determining when a scale had reached its true or final weight was by visual observation. The Fairbanks-Morse unit determines that the correct weight has been reached before allowing the weight to be recorded and readout equipment to be operated, thereby assuring correct weighing without visual observations, the company said. For details check No. 7548 on the coupon and mail to this publication.

No. 7504—Bulk Scale

Burrows Equipment Co. announces the "Weigh-Burro" bulk scale. Features include incorporation of a double-beam custom scale, increased axle clearance for mobility on rough floors, reinforced construction, ease of operation and over-all appearance, company literature reported. The unit has a capacity of 1,000 lb. with scale

readings down to ½ lb. It operates on a gravity discharge principle using an 8 in. by 14 in. dump gate. For information, check No. 7504 on the coupon and mail to this publication.

No. 7553—Auger Elevator

An internal gear drive is a feature of the "Grain Dipper" auger elevator announced by Koyker Manufacturing Co. There are no moving

parts on the outside, providing less vibration, energy loss and more safety, according to company literature. Ample clearance around the gear housing allows a free flow of grain. The 7½ in. auger elevator is the "little brother" of the firm's "Big Dipper" 10 in. auger elevator. Other features include: swinging hopper for ease of positioning unloading vehicles; a grain remover and gathering auger attachment which attaches to the same drive; bearing-supported, splined sections for strength and ease of assembly or transportation; telescoping mounting rails on all-welded frame, and perforated cleaner section. For details check No. 7553 and mail.

No. 7561—Bulk Material Transport

A self-unloading, dry bulk materials transport has been added to the trailer series of Dorsey Trailers.

Send me information on the items marked:

☐ No. 2136—Shovel-Barrow	☐ No. 7587—Generators
☐ No. 2138—Checkweigher	☐ No. 7574—Temperature
☐ No. 2137—Scourer-Aspirator	☐ No. 7602—Applicator
☐ No. 7548—Detector	☐ No. 7604—Shovel-Barrow
☐ No. 7504—Bulk Scale	☐ No. 9048—Palletizer
☐ No. 7553—Elevator	☐ No. 9086—Sampler
☐ No. 7561—Transport	☐ No. 9045—Valve
☐ No. 7591—Booklet	☐ No. 9081—Stabilizer

Others (list numbers) .....

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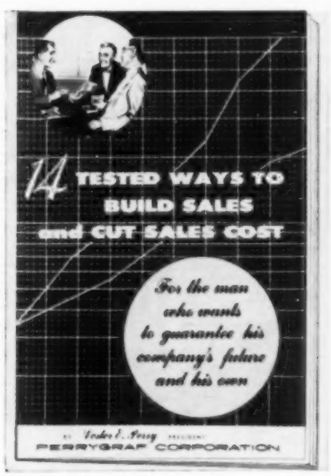
Called the "Cement Transport Model BMC-T," the unit is also designed for hauling other dry bulk materials. The unit has three 20 in. fill hatches with water-tight hatches. It has a twin screw discharge system that unloads at the rate of five barrels a minute. The screws are reversible and each has four air pads. Two-stage drives permit discharge of the rear portion of the load before front screws are engaged. Single point 14 in. downspout and rubberized nylon discharge boot are also standard. The unit is hydraulically powered through a tandem pump operated from the tractor power-take-off. With a 25 h.p. engine, offered as optional, it can operate with any tractor. For details, check No. 7561 on the coupon and mail.

No. 7591—Sales Booklet

A new brochure, entitled "14 Tested Ways to Increase Sales and Cut Sales Cost," has been announced by Perrygraf Corp. Seventy-six pictures and 122 case histories give information on how to pep up the sales program by using slide-charts to put


14 TESTED WAYS TO
BUILD SALES
and CUT SALES COST
For the man who wants to guarantee his company's future and his own
PERRYGRAF CORPORATION

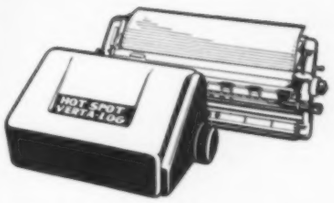
product facts at the fingertips, the company said. Available slide charts include one on how to calculate egg cost based on feed cost and laying rate. Another one shows the amount of feed required to add weight to stock and others show equipment and floor space necessary for different numbers of chickens, dosage for disease prevention and treatment and many similar farm problems. The booklet and other materials are available free by checking No. 7591 on coupon and mailing.

No. 7587—Inert Atmosphere Generators

Gas Atmospheres, Inc., has published a bulletin describing its new line of packaged inert atmosphere generators. The bulletin includes typical installations, applications, features and a comprehensive flow chart. It also includes a utilities table showing at a glance the amounts of gas, power and water required to obtain maximum capacities. For copies of this bulletin, check No. 7587 on the coupon and mail to this publication.

No. 7574—Temperature Recording Unit

Hot Spot Detector, Inc., has announced an economy unit for recording stored grain temperatures. The



new device, the "Verta-Log," will be available as an optional feature on Hot Spot's automatic remote control instrument. "Verta-Log is a secondary recorder and will be used purely as an economy unit," the company said. "It does not contain many of the fine features of the Hot Spot Type-O-Matic, which is an electronic digital recorder and embodies the use of the electric typewriter." The Verta-Log prints vertical records of temperatures indicated at each thermocouple in each cable in the heat detector system. The new device is similar to a calculator or adding machine. It has automatic or manual control and multiple digit entry. For more information, check No. 7574 on the coupon and mail.

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4. Uniform Bulk—milled to minimum variation.
5. Light Color—Pfizer BI-CAP enrichment mixtures are light in color.

The BI-CAP line also includes new BI-CAP Bolted Cornmeal Enrichment, BI-CAP Whole Cornmeal Enrichment and BI-CAP Degerminated Cornmeal Enrichment mixtures. In addition, BI-CAP Macaroni Noodle Enrichment Mixture and BI-CAP Rice Enrichment Mixture are available. Full information about all Pfizer enrichment concentrates is yours on request.

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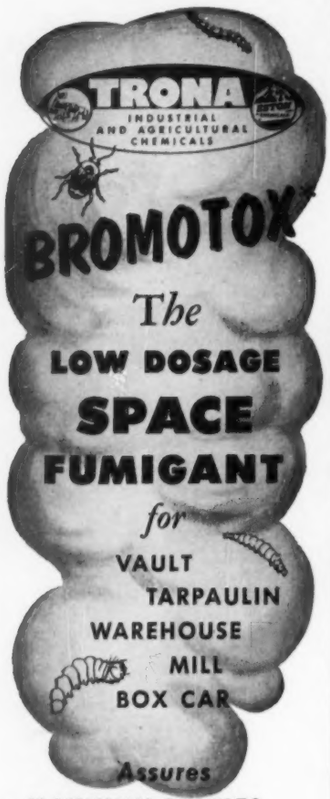

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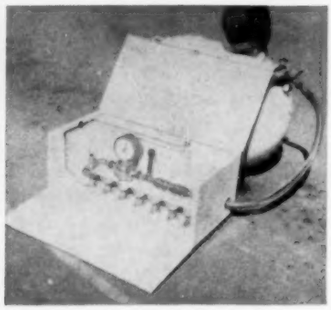
No. 7602—Bulk Fumigant Applicator

A new Dawson bulk fumigant applicator is being introduced by Ferguson Fumigants, Inc., for the application of its 37 fumigant mixture into grain bins, cereal processing plants and warehouses. It is associated with a large bulk tank semi-trailer for over-the-highway delivery to a central storage point where it is transferred into large storage tanks. From the tanks it is transferred to the applicator by a method similar to that used in the bulk distribution of LP



gas. From the bulk tank on the applicator, which can be mounted on a small trailer or truck, liquefied gas passes through a meter that records directly in pounds, the amount of fumigant applied. According to the company the ability to control application rate is important in connection with the fumigation of bulk grain bins. The company can adapt the applicator assembly to any size tank the custom fumigator may require, including setting up the equipment for the largest fumigation jobs which might require up to 30,000 lb. of fumigant for a single grain bin or for a number of large grain storage buildings in the same location. For further information, check No. 7602 on the coupon and mail to this publication.

No. 7604—Shovel-Barrow

A combination shovel and wheelbarrow designed for handling grain and feed in cereal and grain processing plants and elevators has been announced by Gar-Bro Manufacturing Co. According to company literature, in effect, the unit is a giant-size dust pan. It can be loaded quickly without shoveling since the bottom of the tray is at floor level and can be pushed directly into the grain or other bulk material. Balanced construction makes it easy to transport and maneuver with a full load, the company said. A patented raised fulcrum dumping device lifts and tilts the tray for steep, fast unloading. The unit is of all-welded steel construction and has ball bearing wheels and cushion rubber tires. Tray width is 24 in., length 30 in. and overall width 34 in. Net weight is 65 lb. For details, check No. 7604 on the coupon and mail.

No. 9048—Automatic Palletizer

A new automatic palletizer has been introduced by Miller Engineering Corp. for bag stacking operations, particularly those working two or three shifts. The palletizer is said to be completely automatic and requires no operator. According to the makers, each unit features either a Westinghouse Cypak automatic magnetic control system or standard relay controls. As a result, each stage of positioning the patterns and stacking is automatically controlled. Any type of pallet (metal, paper or wood) may be used for stocking, the makers state. Operating parts of the automatic palletizer comprise a motor-driven roller table, an elevator and an automatic ram. The roller table accepts and positions the bags and when a pattern is complete, the roller table moves from under the pattern and automatically stacks it on the elevator below. The elevator, in turn, descends one position as each layer of the stack is added. When a stack is complete, an automatic ram pushes the stack off the elevator for pickup by a fork truck or conveyor. For full details, check No. 9048 on the coupon.

No. 9086—Dust Sampler

The Iso-Kinetic Dust Sampler, designed to measure dust particles discharged from dust control equipment and to determine equipment operating efficiency, has been introduced by the Day Co. The sampler will accurately measure grains of dust passing through dust control ducts, or will measure particles being discharged from dust control equipment, such as

cyclones or other equipment which exhaust to the atmosphere, the company says. The complete unit consists of a rotometer, air-line filter, air pump, oil reservoir, oil trap, electric motor, plastic air-line tubing, rod handle, graduated rod, filter thimbles, thimble holder, thimble ring seals and nozzles. It comes complete with instructions and charts. Check No. 9086 and mail.

No. 9045—Dust-Tight Valve

A new dust-tight valve for use with equipment processing dry solids has been announced by Patterson-Kelley Co., Inc. The valve is described as being compact and stainless for application on equipment involved in blending, conveying, milling or similar operations where discharge and flow of powdered or granular materials must be controlled. Available accessories include special adapters for mounting the valve on existing equipment, the makers state. According to the manufacturers, all components of the new valve are precision machined for complete interchangeability. The valve body is covered with a removable neoprene liner and the vane and "O" ring sealed shafts are made of chromium-nickel stainless steel. Easy adjustments can be made for exact positioning and compensated positioning after long wear, the company says. Check No. 9045 on the coupon for additional literature.

No. 9081—Load Stabilizer Attachment

A load stabilizer attachment designed primarily for handling loads of bags or other unstable materials which have a tendency to ride off skids or pallets, has been developed by Lewis-Shepard Products, Inc. The stabilizer is hydraulically operated from the operating handle and clamps down on top of the load as illustrated.

Various clamping heights may be furnished to suit the height of the load by the adjustable top clamp arm.

The stabilizer is padded by sponged lined pads which clamp down on any material and hold it firmly in place while the load is being transported, according to the manufacturers. This feature is said to be particularly practical when slanted ramps are encountered. Complete information is available by checking No. 9081 on the coupon and mailing.

BREAD IS THE STAFF OF LIFE

CHARTER AMENDMENTS

OKLAHOMA CITY — A group of Thomas, Okla., grain companies have filed amendments of their charters to show changes in capital stock. The companies are: Bird Grain Co., Inc.; Bruce Grain Co., Inc.; Candy Meadows Grain, Inc.; Little Grain Co.; Deitler Grain, Inc.; Robertson Grain Co., Inc.; Wilcox Grain Co., Inc., all showing capital stock of $125,000 each.

Formulation and control of flavorings at General Foods Corp.'s research center, Tarrytown, N.Y., require detailed analysis of their chemical ingredients. Dr. William S. Ryder, leader of the center's flavor chemistry group, relies on the Perkin-Elmer Vapor Fractometer to detect and identify minute components which affect taste and aroma of foods.

Gas Chromatography Aids Flavor Research at General Foods

DEVELOPMENT of new flavorings and quality control of raw materials and formulated flavorings are two vital areas of research at the General Foods Corp.'s research center in Tarrytown, N.Y. Gas chromatography has made important contributions to this work, according to Dr. William S. Ryder, Jr., project leader of the center's flavor chemistry group, by providing researchers with quantitative and qualitative information of a nature never before available. Of almost equal value has been its ability to cut time of analysis from a matter of days to one of hours or minutes.

Analysis by gas chromatography involves passage of vaporized volatile portions of the test sample through a long, narrow column. The column is packed with inert solid material that has been impregnated with an appropriate chemical reagent. Each component of the sample has a unique and characteristic affinity for the column material so that each will move through the column at a different rate of flow. This results in separation of the sample's components as they pass through the tube. As they emerge separately from the column, the individual components are measured by an electrical detection device which communicates their presence and quantity to an automatic recording instrument. The components appear on the recorder's chart as a series of symmetrical peaks. The position of a component on the chart, i.e., the time at which it exited from the column, indicates its identity. The size of its curve describes its quantity.

The high resolution and sensitivity of this device made it eminently suitable to problems of flavor analysis and control. Since the introduction of the first successful commercial instrument in 1955 by the Perkin-Elmer Corp. of Norwalk, Conn., gas chromatography has gained acceptance in the food industry. While its full range of applications is still unexplored, it has already several notable accomplishments to its credit, Dr. Ryder said.

One example of its value involved the first production batch of a new flavor at General Foods. Though thoroughly tested in the development stage, one chemical ingredient was found to have an off-flavor in a last minute test by the taste panel. Chromatography revealed both low and high boiling impurities that had not been present in samples used in experimentation. After redistillation, it verified their removal. Without this scientific detection device, Dr. Ryder said, General Foods would not have attempted to produce the new flavor and all previous work would have been wasted.

Formulation of new flavors is of particular importance to a producer of General Foods' size, a spokesman for the corporation said. Natural flavors are generally available in only limited quantities and tend to be of such subtle and transitory nature that they are not suitable for stockpiling, he explained. Precise analysis of their chemical profile is an essential step in producing a closely similar flavor of more stability that can be produced in adequate quantities.

Another area in which the P-E "Vapor Fractometer" is employed at General Foods is in quality control of raw materials, flavorings and finished food products. Raw materials are fractionated to discover if components are present which might cause off-flavors or spoilage. Various methods of storing are tested by chromatographic examination of raw materials and flavorings after varying periods of storage. Processing techniques are being improved by measuring the effect of individual operations upon raw and formulated ingredients.

Gas chromatography is still a new analytical tool and many applications and techniques remain to be developed. Present limitations pointed out by Dr. Ryder are its inability to handle non-volatile components and the small amount of sampling material that can be put through the unit. Progress is being made in both these areas.

Though the future scope of gas chromatography is not yet defined, Dr. Ryder concluded, it has already opened important new frontiers in food research.

Gas chromatography is employed by University of Massachusetts' Prof. I. S. Fagerson to detect subtle biochemical changes which precede food deterioration. Introduction of this instrument in 1955 significantly broadened food technologists' range of study in food spoilage and flavor control.

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Scale Association Official Terms New Publication 'Must' Reading

WASHINGTON — A U.S. government publication, issued by the National Bureau of Standards, should be "must" reading for personnel of the thousands of processors throughout America, according to Arthur Sanders, executive secretary of the Scale Manufacturers Assn., Washington.

The 27-page publication has been written by Malcolm W. Jensen of the bureau's office of weights and measures and is entitled "Checking Prepackaged Commodities," Mr. Sanders reported. It is available from the Government Printing Office, Washington, for 35¢ a copy.

"Every processor who must comply with weights and measures regulations is well aware of the hazards of weighing mistakes," Mr. Sanders said. "On the one hand, if the processor is inadvertently overfilling his packages, he can lose vast amounts of money in 'giving away' his materials. On the other, if he's giving shortweight—through faulty weighing equipment or faulty operating procedures in his weighing—he leaves himself open for trouble with weights and measures inspectors and the possibility of consequent bad publicity.

"Prepackaged commodities have been a problem for weights and measures officials in recent years. The new booklet the National Bureau of Standards has issued is the result of requests from the thousands of enforcement officials in state and local jurisdictions. The nation has seen a 'prepackaging revolution' in recent years, entirely altering its mode of merchandising in many industries. The new booklet is a guide to weights and measures officials around the nation, but it is equally valuable for processors who prepackage goods sold in commerce. It shows the ground rules they will be expected to meet."

Too many "worthwhile" government publications are "written and then sit on the shelf," Mr. Sanders said. "This is one that most processors could profitably study," he noted. "The Scale Manufacturers Association is calling attention to it as a public service."

Among the many points the booklet makes are:

1. Variations in quantities of packages are not permitted to such extent that the average of the packages comprising a lot . . . is below the quantity stated, and an unreasonable shortage in any individual package is not acceptable . . .

2. Perfection in either mechanical devices or human beings has not yet been attained; thus the existence of imperfection must be recognized and allowances for such imperfections must be made. These allowances are recognized in the "average" concept.

The booklet notes that although: "The primary object of the weights and measures inspector is to see that quantity is accurately represented to the ultimate purchaser—the consumer; nevertheless, he may be of very real service to the manufacturer, distributor or retailer . . ."

—BREAD IS THE STAFF OF LIFE—

ELEVATORS DESTROYED

WIGGINS, COLO. — Fire recently destroyed two grain elevators, an office building and a warehouse of the Wiggins Farmers Cooperative Co. Loss was estimated at $135,000. Only the firm's business records were saved. The loss included 22,000 bu. corn, wheat and barley, 30 electric motors used in operation of the elevators and sacked feed and seed in a retail sales section of the office building.

Sturtevant Grain Processing Division Offers Refining System

BOSTON — Sturtevant Mill Co., Boston, announced the introduction of a new flour refining system which produces three grades of flour in one operation. Heart of the system is a Sturtevant air classifier which classifies coarse, fine and superfine fractions. The low micron separation possible with the classifier will allow effective starch-protein shifting, an engineer for the company said. The system incorporates auxiliary equipment, among which is the Sturtevant Pulver-Mill, a vertical impact pulverizer introduced by the company only two months ago, after a year of production plant test operations.

The Sturtevant flour refining system will be marketed through the company's newly-formed grain processing division, Fostoria, Ohio. In the refining system, selection of end products is made by means of exacting control of air currents and centrifugal force, with simple adjustments in counter action between these two forces permitting the recovery of almost any desired particle size, thus allowing economical production of flour to customer specifications, despite mill location in a strong or weak wheat area, the engineer said.

—BREAD IS THE STAFF OF LIFE—

Monsanto Earnings Reach Record Level

ST. LOUIS — Monsanto Chemical Co.'s consolidated sales and earnings for the first six months of 1959 reached record levels, and such sales and earnings for the second quarter were the highest achieved in any quarter in the company's history.

Sales for the first six months of 1959 for Monsanto consolidated amounted to $413,708,000 compared to $337,275,000 for the same period last year. Included in Monsanto consolidated sales are those of the parent company, its domestic and foreign subsidiaries and that portion of the sales of associated companies represented by Monsanto's 50% ownership.

Net earnings from such consolidated sales were $33,759,000, an increase of 102% over earnings of $16,741,000 for the first six months of 1958. These earnings, which are after allowance for taxes payable if Monsanto's share of undistributed profits of subsidiary and associated companies had been received by the parent company as dividends, were equivalent to $1.51 a common share on 22,401,446 shares outstanding. For the first six months of 1958 such earnings were equal to 75¢ a share on 22,256,600 shares outstanding.

Strong-Scott Reports Equipment Sales Boost

MINNEAPOLIS — Sales of grain processing equipment for the Strong-Scott Manufacturing Co., Minneapolis, are 10% ahead of last year at this time, R. R. Strong, executive vice president, announced at a recent company sales meeting. He said the firm is expecting the best year of its 62-year history.

Special topics presented to the group by members of the company were: "Service and Service Policies," by A. J. Bury, assistant sales manager of the grain division, and reports and test data on new equipment in the field by W. B. Burnet, director of engineering, and G. A. Carlson, chief engineer.

The meeting was held at a resort in northern Minnesota, and included staff members' wives.

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(4) Hyperbolic sideboard ends permit greater load capacity without "slopping."

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Better Man-Lift Over-Travel Devices Described

By GEORGE STEEL
Safety Director
Ralston Purina Co.

EDITOR'S NOTE: This report by Mr. Steel and photos by Mr. Snyder originally appeared in the Safety News Letter, Food and Beverage Section, of the National Safety Council. L. H. Gretzer, director of safety for Cargill, Inc., is editor of this publication.

THE code for safety on man-lifts provides for two over-travel devices at the top of the lift. One should be mechanical and one may be a photoelectric cell.

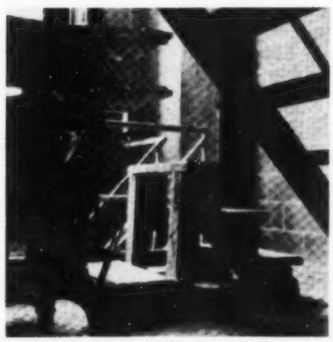
A good many years ago, the Ralston Purina Co. installed photoelectric devices on all man-lifts. Keeping them operating was a big maintenance problem. They required very fine adjustments. A small film of dust on either lens caused them to "kick-out."

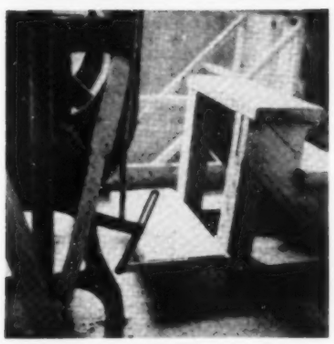
Several years ago, our engineering department ran some tests on the use of a boiler flame control cell as a safety device for man-lifts. These cells are sensitive only to flickering light. Bright daylight or light from ordinary lamps does not affect them. Another advantage is that they will pick up the impulses from intermittent light sources through light clouds or layers of dust. In tests they were effective when two sheets of tissue paper covered the cell and when the light source was 20 feet away.

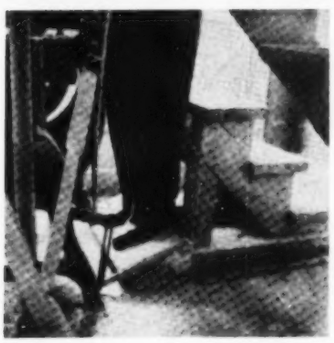
As rapidly as we can, we are replacing the "electric eyes" with this new device.

The cell is mounted on one side of the hoist. Across the path of the steps, an ordinary light bulb with a flasher in its circuit is installed.

The cell can be adjusted so that it is sensitive to various periods of light and dark from the light sources. This is set so that a "blink" of the light and a step passing through the beam just before or after the dark period of the bulb does not stop the hoist. Any longer period of darkness, such as caused by an object thicker than a step cutting the light, stops the hoist. This is the most fool-proof and efficient device that we know of.







James Snyder, manager of safety and fire protection for Hiram Walker and Sons, Peoria, Ill., has provided the accompanying pictures of another man-lift safety device. The closeup of the linkage between the safety step and the shut-off cord shows how the safety step is installed. This man-lift safety device should be of interest to those working in plants equipped with the Humphrey type man-lift. This device lends itself particularly to installation where the position of the man-lift tail pulley is such that a hazard is present to men descending and getting off the lift at the bottom landing.

—BREAD IS THE STAFF OF LIFE—

District 4, AOM, Aug. 14 Meeting Program Stated

MINNEAPOLIS — Two speakers and an open discussion are scheduled for presentation at the meeting of District No. 4, Association of Operative Millers, at the Radisson Hotel, Minneapolis, Aug. 14. The meeting will begin with a luncheon at noon, William Howie, J. K. Howie Co., district secretary, has announced.

A paper on a "Review of Wheat Conditioning Problems," which was prepared by Fred Atkinson, president, Atkinson Milling Co., Minneapolis, will be read by David Mattson, Atkinson.

"The Young Miller and His Future" will be discussed by J. George Kehr, Russell-Miller Milling Co.

The meeting will conclude with an open discussion on milling. The moderators will be Robert Ellis, International Milling Co., and Kenneth L. Nordstrom, General Mills, Inc.

—BREAD IS THE STAFF OF LIFE—

Ohio Firm Builds Grain Storage Bins

MAUMEE, OHIO — A $5 million mortgage has been filed in the office of the country recorder involving a loan by the Northwestern Mutual Life Insurance Co., Milwaukee, to Anderson Farmer Corp., Maumee, and the Andersons, a limited partnership consisting of 13 Andersons.

The money, according to John D. Anderson, a partner of the Andersons, will be used to complete construction of storage bins for 10 million bushels of grain at the Anderson elevator, Maumee, and storage for 500,000 bu. at the Middlegrounds.

Costs in Southern Rice Mills Studied

WASHINGTON—The cost of processing a given quantity of rice in the South depends chiefly on the total volume of rough rice milled and the percentage of milled rice packaged in consumer containers, according to a report issued by the U.S. Department of Agriculture.

Researchers of USDA's Agricultural Marketing Service found that three-fourths of all differences in total costs per 100 lb. of rough rice milled in 23 southern mills during the 1956-57 milling season resulted from differences in the volume produced and in the percentage packaged in consumer containers of 5 lb. or less. Variations in other operations (such as drying) performed by the mills made only slight differences in costs.

Total cost per 100 lb. of rough rice in the 23 mills for all types of services, excluding transportation and the cost of rough rice, ranged from 63¢ to $1.48, with an average of 98¢, the report states. Salaries, wages, and commissions averaged 37% of the total cost, with salaries to production labor accounting for more than half of this amount. The cost of packaging material and bags represented 21% of the total.

In the mills that sold all of their product in bulk or bags, the total cost averaged about 73¢. Mills that prepared rice for sale in consumer packages had an average packaging cost of about $1.47 per 100 lb. of milled rice packaged.

—BREAD IS THE STAFF OF LIFE—

St. Regis Reports Sales, Income Gains

NEW YORK—St. Regis Paper Co. has reported net sales of the company and its subsidiaries of $211,175,529 for the first six months of 1959. This compared with net sales of $178,874,289 for the comparable period of last year.

Consolidated net income, after provision for taxes, amounted to $13,422,471, equivalent after deduction of preferred dividends, to $1.50 a share on 8,820,698 shares of common stock outstanding on June 30. This compared with net income of $8,069,009 in the first half of last year, which was equivalent to 93¢ a share on 8,158,005 shares outstanding.

For the first six months of the year, the company reports that sales increased by 18% and earnings by 67% above the same months of 1958.

Operations of St. Regis in the second quarter of 1959 showed substantial gains over the first quarter as recovery continued in practically all markets served by the company.

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ROLLS

(Continued from page 1a)

aid of the "Briviskop" (Fig. 4), the surface hardness "Brinell" is determined. But for all rolls the hardness may be measured at all points of a cross-section.

For testing the surface of the roll when finished-machined, a highly developed appliance, (the Perth-O-Meter, Fig. 5), is adopted. As is known, the surface-roughness or the surface-smoothness of a roll has a great influence on the grinding effect. With this appliance, the surfaces to be judged can be magnified from 100 to several hundred times and drawn on a strip of paper; the international values of roughness are then read and compared with each other. The apparatus makes use of a very fine diamond point which is guided automatically over the surface to be measured, thus picking up the movements electronically and recording them (Fig. 6). This surface roughness is, to a certain extent, recorded not only by technical measuring means, but also photographically. With a specially designed metal-microscope which can be set onto the rolls, also plastic photographs may be taken for later comparison (Figs. 7 and 8).

All test data thus obtained are plotted on the roll cards. By systematically determining and recording all these qualities, and by making a continuous control at the client's works, it is possible to follow the change in quality of rolls for years on end, if necessary, and to change them to suit requirements and the desires of the client.

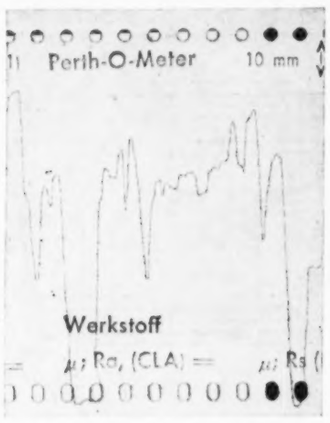

Fig. 6. The findings of the "Perth-O-Meter" are magnified electronically and registered. The roughness diagram is magnified 100 times in length and 400 times in depth.

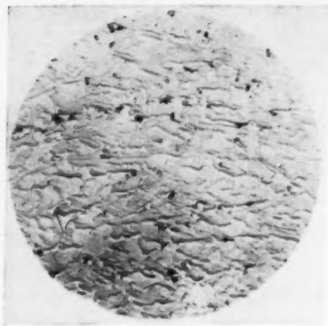

Fig. 7. Surface of a centrifugally cast roll, smooth, not corroded, magnified 100 times.

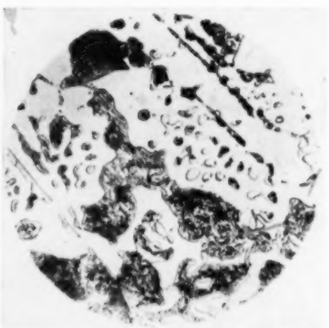

Fig. 8. Surface of a centrifugally cast roll, smooth, corroded, magnified 500 times.

"Why yes, dear, as a matter of fact we did play some cards after the convention."

New Crop Wheat Will Be Topic Of AACC Unit

KANSAS CITY— The Kansas City Section of the American Association of Cereal Chemists will discuss the milling and baking characteristics of new crop wheat at a meeting at the Hotel President, Kansas City, Aug. 15.

Discussion will be in the hands of a panel consisting of Howard C. Becker, Nebraska Consolidated Mills Co., Omaha; Lawrence Iliff, General Mills, Inc., Kansas City; John W. Giertz, Kansas Milling Co., Wichita; George W. Schiller, the Pillsbury Co., Enid, Okla.; Charles T. Newell, Burrus Mills, Ft. Worth; Marvin Lawrenson, Colorado Milling & Elevator Co., Denver, and Charles W. Pence, Kansas Wheat Improvement Assn., Manhattan.

Two other speakers are scheduled. In the morning, Dr. Armand Pauli, department of agronomy, Kansas State University, will talk on environmental factors in wheat production and, after luncheon, Dwane Foote, Nebraska Wheat Improvement Assn., Lincoln, will talk on wheat varieties of the future.

An informal get-together and meetings of various committees will take place at the President Hotel the evening preceding the meeting, beginning at 6 p.m.

——BREAD IS THE STAFF OF LIFE——

George H. Grohs Estate Value

BUFFALO—George H. Grohs, 85, retired superintendent of the Ralston Purina Co. plant, left a gross estate of $742,258.62 when he died March 28. A state tax appraisal was filed in surrogate's court, showing that he owned 13,800 shares of common stock in Purina, valued at $703,800. Mr. Grohs, then a millwright, was sent to Buffalo from St. Louis many years ago to rebuilt the old Husted Co. He later became superintendent of that company. He retired in 1927.

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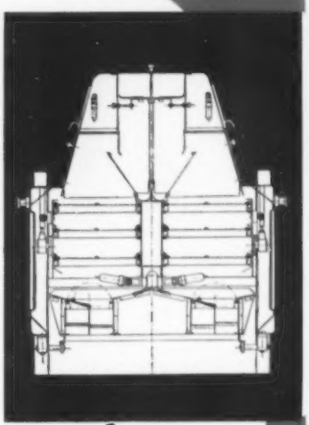
Yes . . . and there's a good reason, because lighter particles are stratified on the top sieve where they are carried away by air or tailed over. Thus, the two lower sieves have clean products.

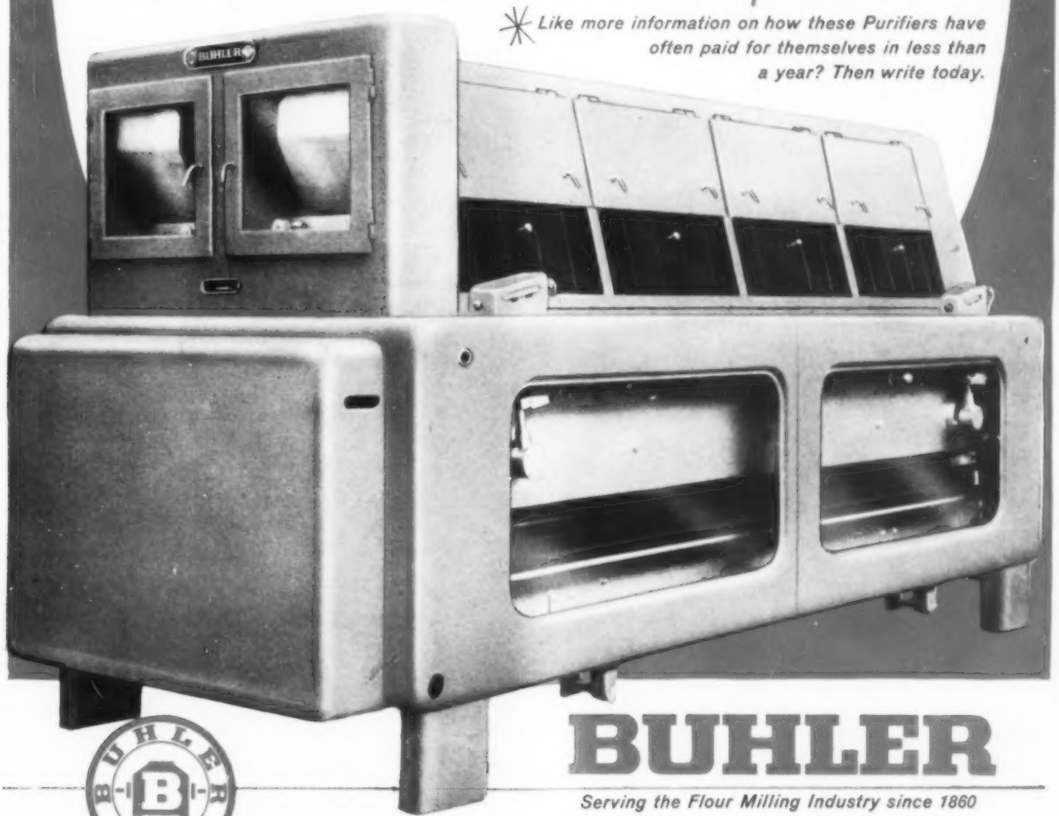
And here are just a few of the *other* important advantages you get when you switch to BUHLER *Triple-Deck* PURIFIERS.

- Highest percentage of clean, low-ash middlings . . . because middlings are classified by quality as well as size . . . and because the sub-divided air-hood with individual covers above each sieve give unequalled accuracy of air control.
- No need for re-purification under normal conditions. With 3 decks, a single pass does the job.
- Three decks of sieves permit more separations than is possible with 1 or 2-deck purifiers.
- Sieve cleaning is completely automatic and trouble-free. Frames are equipped with silk-tightening device.
- Flow fluctuations caused by changes in wheat quality are easily seen and corrected. Sieves are interchangeable while machine is running.
- Dependable operation and less maintenance because fewer moving parts than any other purifier. Simple BUHLER drive needs only ½ hp.
- Oscillating troughs convey purified stock gently with no attrition of flour.
- Easy to install and operate.



Triple-Deck PURIFIERS such as the Model MQRC shown here, were developed and are manufactured *only* by BUHLER.

Like more information on how these Purifiers have often paid for themselves in less than a year? Then write today.



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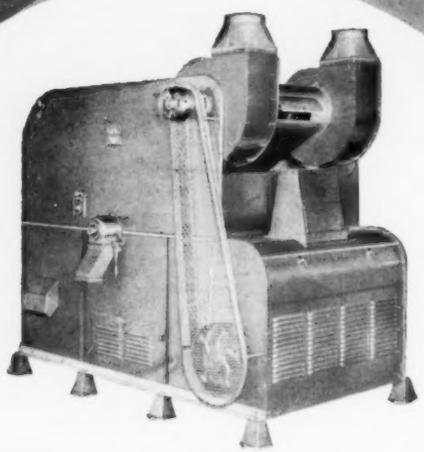
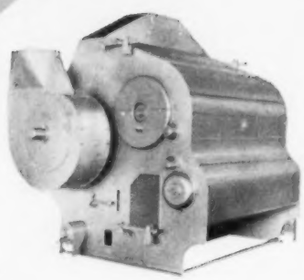
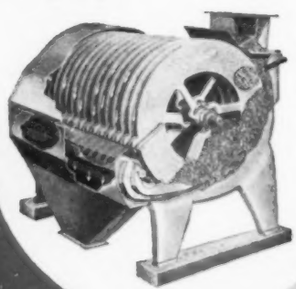


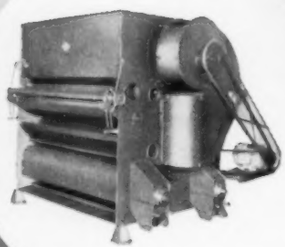
Above: the CARTER MILLERATOR has established new highs in screen and air separation. Outstanding for refined scalping, mechanical sifting, and a thorough aspiration for removal of light screenings. Power requirements are low for its capacity. All-metal, all-enclosed. Write today for folder describing the new Millerator and giving all details and dimensons.



Above: the SCALPERATOR. Big capacity scalping, aspirating, aerating. Extensively used in the milling industry to rough scalp and aspirate grain ahead of storage — to aerate grain when turned for cooling. Capacities to 6,000 bushels per hour.



Left: the closed circuit DUO-ASPIRATOR. A compact unit for closely controlled aspiration. Requires no dust collector. Removes light screenings, shriveled wheat, pin oats and foul seeds. Also available in open circuit model.



Above: the CARTER DISC SEPARATOR. Standard of cleaning accuracy throughout the milling industry. Provides exact separations by length. Available in single machines for removal of cockle or oats; in combination units to remove oats and cockle in one operation. Many sizes and capacities.

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